CLAIMS:

1. A tunneling magnetoresistive stack comprising:
a first ferromagnetic layer;
a tunnel barrier layer on the first ferromagnetic layer; and
a second ferromagnetic layer on the tunnel barrier layer, wherein the tunneling magnetoresistive stack exhibits a negative exchange coupling between the first ferromagnetic layer and the second ferromagnetic layer.

2. The tunneling magnetoresistive stack of claim 1, wherein the tunnel barrier layer comprises an oxidized titanium alloy.

3 The tunneling magnetoresistive stack of claim 2, wherein the oxidized titanium alloy includes a dopant.

4 The tunneling magnetoresistive stack of claim 3, wherein the dopant is an element of the group consisting of Nb, Cr, Mo, P, Si, V, W, B, and Co.

5. The tunneling magnetoresistive stack of claim 2, wherein the oxidized titanium alloy includes an oxide of a metal of the group consisting of aluminum, zirconium, and halfnium.

6. The tunneling magnetoresistive stack of claim 1, wherein the tunnel barrier layer also comprises a dopant.

7. The tunneling magnetoresistive stack of claim 1, wherein the tunnel barrier layer comprises $Ti_xAl_yO_z$.

8. The tunneling magnetoresistive stack of claim 1, wherein the tunnel barrier layer comprises a combination of titanium, aluminum, and oxygen as represented in FIG. 6 as the line from TiO_2 to Al_2O_3.

9. The tunneling magnetoresistive stack of claim 1, wherein the first ferromagnetic layer is a pinned layer.

10. The tunneling magnetoresistive stack of claim 1, wherein the second ferromagnetic layer is a free layer.

11. A tunneling magnetoresistive stack comprising:

a first ferromagnetic layer;

a second ferromagnetic layer; and

a tunnel barrier layer between the first and second ferromagnetic layers, wherein the tunnel barrier layer is an oxide of a titanium alloy.

12. The tunneling magnetoresistive stack of claim 11, wherein the oxide of a titanium alloy includes aluminum.

13. The tunneling magnetoresistive stack of claim 11, wherein the magnetoresistive stack exhibits a negative exchange coupling between the first ferromagnetic layer and the second ferromagnetic layer.

14. The tunneling magnetoresistive stack of claim 11, wherein the first ferromagnetic layer and the second ferromagnetic layer each have a thickness in the range of 10Å to 200Å.

15. The tunneling magnetoresistive stack of claim 11, wherein the tunnel barrier layer has a thickness less than 30Å.

16. The tunneling magnetoresistive stack of claim 11, wherein the tunnel barrier includes a dopant.

17. The tunneling magnetoresistive stack of claim 16, wherein the dopant is an element of the group consisting of Nb, Cr, Mo, P, Si, V, W, B, and Co.

18. A method of forming a tunneling magnetoresistive stack, the method comprising:

forming a first ferromagnetic layer;

forming a tunnel barrier layer of a titanium alloy on the first ferromagnetic layer; and

forming a second ferromagnetic layer on the tunnel barrier layer.

19. The method of claim 18, wherein forming the first ferromagnetic layer is performed by a process selected from the group consisting of sputter deposition, evaporation, chemical vapor deposition, atomic layer deposition, molecular beam epitaxy, molecular beam deposition, RF deposition, and reactive deposition.

20. The method of claim 18, wherein forming the second ferromagnetic layer is performed by a process selected from the group consisting of sputter deposition, evaporation, chemical vapor deposition, atomic layer deposition, molecular beam epitaxy, molecular beam deposition, RF deposition, and reactive deposition.

21. The method of claim 18, wherein forming the tunnel barrier layer is performed by a process selected from the group consisting of sputter deposition, evaporation, chemical vapor deposition, atomic layer deposition, molecular beam epitaxy, molecular beam deposition, RF deposition, and reactive deposition.

22. The method of claim 18, wherein forming the tunnel barrier layer comprises RF sputtering to form $Ti_xAl_yO_z$.

23. The method of claim 18 further comprising:

annealing the tunneling magnetoresistive stack.

24. The method of claim 23, wherein annealing is performed at a temperature in the range of 100°C to 350°C.

25. The method of claim 18, wherein forming a tunnel barrier layer comprises:

depositing the titanium alloy on the first ferromagnetic layer; and

oxidizing the titanium alloy.

26. The method of claim 25, wherein depositing the titanium alloy and oxidizing the titanium alloy occur simultaneously.

27. The method of claim 25, wherein oxidizing the titanium alloy is performed by a process selected from the group consisting of natural oxidation, radical shower oxidation, ultraviolet light assisted oxidation, ion beam oxidation, infrared assisted oxidation, x-ray assisted oxidation, or plasma oxidation.

28. The method of claim 25, wherein oxidizing the titanium alloy is performed with an oxidation pressure in the range of 1 millitorr to 30 torr.